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A Summary of Current Program 7/1/65
and Preliminary Report of Progress
for 7/1/64 to 6/30/65

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CLOTHING AND HOUSING

RESEARCH DIVISION

of the

AGRICULTURAL RESEARCH SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

and related work of the

STATE AGRICULTURAL EXPERIMENT STATIONS

This progress report is primarily a tool for use of scientists and administrators in program coordination, development and evaluation; and for use of advisory committees in program review and development of recommendations for future research programs.

The summaries of progress on USDA and cooperative research include some tentative results that have not been tested sufficiently to justify general release. Such findings, when adequately confirmed, will be released promptly through established channels. Because of this, the report is not intended for publication and should not be referred to in literature citations. Copies are distributed only to members of Department staff, advisory committee members and others having a special interest in the development of public agricultural research programs.

This report also includes a list of publications reporting results of USDA and cooperative research issued between July 1, 1964, and June 30, 1965. Current agricultural research findings are also published in the monthly USDA publication, Agricultural Research. This progress report was compiled in the Clothing and Housing Research Division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Maryland.

UNITED STATES DEPARTMENT OF AGRICULTURE

Washington, D. C.

July 1, 1965

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INTRODUCTION

Clothing and housing are of national concern because they constitute the immediate protective environment in which people live and work. The increase in public and private programs to improve economic opportunities for disadvantaged segments of the population, such as the low-income and the elderly, intensifies the demand for information about clothing and housing. Research-based guidance materials are needed to help consumers of different socioeconomic and cultural backgrounds, and living in different climatic areas, to make wise decisions regarding use of resources available to them.

The program of the Clothing and Housing Research Division was planned to provide basic information concerning functional needs for clothing and housing, and to determine the extent to which these needs can be more effectively met through improved use of the resources of individuals, families, and communities. Continually in focus is the Department's responsibility to provide research-based information of two types: 1) that needed for programs to improve the levels of living; and 2) that needed to improve consumer satisfaction in use of cotton, wool, leather, and other agricultural products.

Findings are reported in scientific articles and technical bulletins, in semitechnical reports for use by leaders in education, industry, and government, and (in collaboration with information specialists) in consumer publications, exhibits, TV and radio releases, and other means of reaching the layman.

The Clothing and Housing Research Division has its headquarters at the Agricultural Research Center, Beltsville, Md. It is organized into two Laboratories: 1) Clothing and Textiles, and 2) Housing and Equipment. The Division's in-house effort amounts to 25.0 professional man-years (as of January 1, 1965). Approximately 20 percent of the present effort is

identified as basic research. The present report summarizes the current program of the Division and of the State Experiment Stations in the areas reported, and presents briefly the Division's progress toward the objectives of the Federal program during Fiscal Year 1965.

Three examples of recent accomplishments are given below:

Microbiology of Drycleaning Investigated. That bacteria can survive modern commercial drycleaning procedures and can be transferred from one garment to another during cleaning has been shown by CH research. In a study carried out in a modern, well-operated drycleaning plant, solvents had little or no disinfecting action though some bacteria presumably were washed out of the fabrics. Significant numbers of bacteria were redeposited on clean garments during the washing of ordinary soiled garments in drycleaning units. Various stages in the process, especially steam finishing and pressing, eliminated or markedly reduced the number of bacteria on some areas of the garments but not on protected areas such as the inside of pockets.

Method Developed for Evaluating Performance of Mechanical Dishwashers. A method to evaluate performance of home-type dishwashers was developed that included the formulation and application of a laboratory soil and a technique for using judges randomly selected from a panel to rate the physical cleanness of the dishwashing loads. The laboratory soil designated as B-19, demonstrated differences in performance among 14 dishwashers to a finer degree than did the two laboratory soils developed by industry selected for comparison purposes. The B-19 soil required less time to prepare. A higher coefficient resulted from the correlation of removal of B-19 soil with natural soil from dishwasher loads than the correlation of removal of industry soils with natural soil.

Temperature and Humidity in the Home Affect Efficiency of Workers. CH research has shown that a hot humid environment imposes increased physiological stress and lessens mechanical efficiency of women performing household activities. Energy expended in performing a light and a strenuous activity increased significantly in a hot, humid environment (95°F, 65% relative humidity) as compared with a comfortable one (75°F, 45% relative humidity). The hot humid environment also increased blood pressure, pulse rate, and body temperature and caused weight loss. The effect of environment was most pronounced at the strenuous work level. The research provides evidence not previously available that a home environment adjusted to proper levels of temperature and relative humidity and clothing to assure thermal comfort are extremely important to the health and efficiency of the individual doing physical work.

AREA NO. 1: CLOTHING, HOUSEHOLD TEXTILES,
AND FABRICS FOR CONSUMER USE

Problem. The ever increasing variety of fibers, constructions and finishes used in household textiles and apparel, makes decisions by consumers more and more difficult. The mandatory labeling of textile products as to fiber content only partially solves the problem. To obtain maximum benefit from such labeling, consumers need information on the properties imparted to textiles by different natural and manmade fibers, fiber blends, fabric constructions and finishes, and on the properties textiles need for satisfactory performance in specific uses. Consumers also need improved sizing systems for patterns and readymade clothing (including shoes) and designs for garment features that will contribute to the comfort, safety, and efficiency of the wearer.

USDA AND COOPERATIVE PROGRAMS

Investigations include studies of the relationship of in-use performance of fabrics of known fiber type, construction, and finish with laboratory determinations of such properties as elastic behavior, dimensional stability and resistance to abrasion. Changes in appearance and other properties during use are followed both subjectively and objectively. Rapid and dependable methods for predicting performance in use are sought. Principles of construction for use in making, repairing, or altering clothing and household textiles are developed. Anthropometric data are obtained as a basis for the sizing of apparel. Clothing problems of both normal and handicapped individuals are identified through interviews and observations and garment features are designed to solve these problems. Special attention is given to problems related to consumer use of clothing and household textiles made from cotton and wool.

The Federal scientific effort in this area, totaling 7.0 professional man-years, 2.0 of which is devoted to basic research, includes physicists, chemists, home economists and specialists in textiles and clothing. Their headquarters is at Beltsville, Md.

PROGRAM OF THE STATE EXPERIMENT STATIONS

The States are engaged in basic and applied research on textile fibers and on the end-use performance of clothing and household textile articles.

Textile specialists in the Southern region are completing a study on the relationship of such fiber properties as elongation, tear resistance, breaking strength and abrasion resistance to end-use performance of fabrics made from fibers of known physical properties. The results of such research are of importance to both cotton producers and consumers.

Researchers in the Western region have completed a study of the role of such environmental factors as light, temperature, relative humidity and air pollution in the degradation of cotton fabrics. A manuscript is in preparation.

In the North Central region work is in progress on the effect of repeated stresses of small magnitude (e.g., torsional, abrasive, tensile) on the behavior of fabrics of different fiber types and construction. Since such stresses do occur under in-use conditions (bending, stretching, etc.) results of such research should provide basic information that may be used in predicting fabric performance.

Textile specialists and social scientists in the Northeastern region are collaborating in a study of the attributes of consumer satisfaction in relation to laboratory and in-use performance tests of certain household textile articles. The results of this research will provide useful information for both consumer and manufacturer.

Non-regional studies deal with: service qualities of soft floor coverings including development of an accelerated laboratory procedure designed to predict in-service performance; dimensional stability and thermal transmission of cellular constructed blankets; a possible relationship between air permeability and fiber degradation; electric properties of cotton fibers; a comparison of the serviceability of garments made from stretch fabrics with those made from non-stretch ones; the relation of price to quality characteristics of selected fabrics.

The State program focuses on fiber and fabric properties as related to consumer-use problems. The total State research in this area involved approximately 22.1 professional man-years, with 24 States contributing. Over two-thirds of the federally supported projects contribute to regional programs.

PROGRESS -- USDA AND COOPERATIVE PROGRAMS

A. Performance of Fabrics for Clothing and Household Textiles

Studies on elongation and elastic recovery of plain and double knit cotton fabrics were completed, and the results summarized for publication. Elongation and growth increased inversely with the ratio of diameter of yarn to stitch length cover factor. This information provides a basis for control of elastic properties of knit fabrics.

Determinations were made of the elastic behavior and dimensional stability of wool fabrics made from yarns spun from top with and without Wurlan finish. As expected the fabrics with Wurlan finish shrank less in laundering than those without the finish and the finish did not alter the elastic properties. Dimensional changes in fabrics without Wurlan finish

can be controlled by the cover factor and the ratio of wale spacing to course spacing. The results have been summarized for publication.

Four manuscripts on serviceability of cotton and wool fabrics were submitted for publication: Comparative Performance Characteristics of Whipcord of Wools versus Blends with Viscose or Nylon; The Effect of Yarn and Cloth Construction on Properties of Apparel Fabrics of Deltapine 15 Cotton. Part I: Laboratory Evaluation of Nine Shirtings and Part II: End-Use Performance; Durability of Serge in Trousers; and Slip Covers Made of 35 Fabrics. A manuscript titled "Dimensional Stability and Elastic Properties of Plain Knit Wool Fabrics with and without Wurlan Finish" was prepared, and has been accepted for publication by the Textile Research Journal.

B. Anthropometric Measurements Basic to the Sizing of Clothing

Research on procedures for making anthropometric measurements of children's feet was initiated through contract with the University of Rochester. A tentative design was developed for instrumentation involving the use of a combination of roentgenographic, photographic and electronic devices. An annotated bibliography on measurement of the human foot with special emphasis on children's feet was mimeographed.

C. Functional Requirements for Clothing

Exploratory work was done on a questionnaire designed to identify clothing problems common to many physically handicapped children, as a basis for development of alleviative garment features.

D. Information for Consumer Guidance

Home and Garden Bulletin No. 59 "Simplified Clothing Construction" was slightly revised.

Manuscripts for two publications, one on clothing repair and the other on pattern alteration have been sent to the printer. A manuscript titled Draw Draperies with a Patterned Fabric was submitted to the Journal of Home Economics.

Seven articles were prepared for the 1965 Yearbook of Agriculture, Consumers All: "Shoes," "Knitted Fabrics," "Carpets and Rugs," "Window Curtains," "Clothing the Family," "Clothes that Fit," and "Stretch Fabrics."

PUBLICATIONS -- USDA AND COOPERATIVE PROGRAMS

Performance of Fabrics for Clothing and Household Textiles

Fletcher, H. M. and Roberts, S. H. 1965. Elastic Properties of Plain and Double Knit Cotton Fabrics. Textile Res. Jour. 35(6): 497-503.

Fletcher, H. M. and Roberts, S. H. 1965. Performance of Knit Fabrics . . . of Pima S-1, Peeler and Karnak Cottons . . . of Cotton-Nylon Blends. Knitting Indus. 85(14): 14-15ff.

Fletcher, H. M. and Roberts, S. H. 1964. Three Methods for Measuring Elastic Recovery of Knit Fabrics. Textile Res. Jour. 34(7): 649-652.

Information for Consumer Guidance

Smith, M. 1964. How to Tailor a Woman's Suit. Home and Garden Bul. No. 20, 24 pp. (Sl. Rev.)

AREA NO. 2: HOME CARE OF TEXTILES: CHEMICAL AND MICROBIOLOGICAL PROBLEMS

Problem. The family's supply of clothing and household textile items represents a considerable initial investment and requires a never-ending expenditure of time and money for keeping it in good condition. Reliable information about laundry aids, such as detergents, bleaches, and fluorescent brighteners for household use, is therefore in great demand. Requests are also received for information on removal of pesticide residues from work clothes. To furnish guidance to consumers on selection and use of appropriate agents, more needs to be known about the nature of soils, stains, and contaminants, and their removal from cotton, wool, and other fabrics. Environmental and other factors that accelerate undesirable changes in appearance or other properties of textile materials, and on means to prevent such changes should be investigated. As textiles are potential disseminators of pathogenic and odor-producing microorganisms, investigations are needed on factors influencing their survival on fabrics, and on methods suitable for consumer use, for controlling such transmission.

USDA AND COOPERATIVE PROGRAMS

The Department has a continuing program to investigate 1) the nature of soil and its removal from fabrics, 2) the nature, causes, and prevention of undesirable changes in fabrics, and 3) the role of fabrics in the dissemination of microorganisms and means of control. Fabrics differing in construction, fiber content and finish are used in the work. Families and individuals cooperate in studies of natural soiling of clothing and household textiles, and of home-type laundering.

The research effort, totaling 6.5 professional man-years, one of which is devoted to basic research, includes chemists, microbiologists, and textile specialists. Their headquarters is at Beltsville, Md.

PROGRAM OF THE STATE EXPERIMENT STATIONS

The States have only a limited program in this area. In the Western region researchers have prepared an outline for a regional project designed to study the efficiency and cost of laundering as related to differences in water quality, wash water temperature, and type of detergent. The current consumer interest in laundering at low wash-water temperatures, as well as the availability of detergents that are relatively more biodegradable, combine to make this a most timely proposal.

Non-regional research includes studies on the effect of heat, light, solvents and laundering on laminated apparel and household textile articles; and on the evaluation of fabrics treated with antibacterial agents. One State is carrying out basic research on the nature of the residual soil on laundered fabrics and on the method of its attachment to the fibers.

The total State program in fiscal 1964 was 1.7 professional man-years.

PROGRESS--USDA AND COOPERATIVE PROGRAMS

A. Removal of Soil and Prevention of Undesirable Changes in Textiles

To supply quantitative information for more efficient and safer use of liquid chlorine bleaches, studies on the interactions between cotton fabric, four soils and sodium hypochlorite continued. Both damage to the fabric and yellowness varied with the type of soil, pH of the hypochlorite solution and total amount of available chlorine which reacted with the fabric.

Studies on the whitening effects of ten fluorescent compounds on unsoiled fabrics were completed. Effectiveness of three stilbene and three coumarin whiteners was adversely affected by sodium hypochlorite. Therefore these six chemicals produced greater whiteness when the bleach was added to the wash several minutes after addition of the whitener. On the other hand, the benzimidazole, benzoxazole and benzidine sulfone whiteners retained all or most of their whitening activity in the presence of hypochlorite bleach. Hence, it was not necessary to delay addition of the bleach.

Three manuscripts were cleared for publication: Color Effects of Different Fluorescent Whiteners; Yellowing of Fabrics During Storage; and Effect of Sodium Hypochlorite Solutions on Soiled and Unsoiled Cotton Fabrics. Three articles were prepared for the 1965 Yearbook of Agriculture, Consumers All: Hidden Damage, Removing Stains, and Soaps and Syndets.

B. Dissemination of Microorganisms by Fabrics

Studies on the factors that influence redeposition of bacteria on fabrics during laundering were continued. The force with which bacteria come in contact with the fabrics appeared to be the critical factor, with fiber type, water temperature, presence of soil, and fabric construction next in importance. The laboratory procedures developed are suitable for simulated in-use evaluation of disinfectants.

More bacteria was recovered from fabrics washed at 55° F. than at 130° F. under both simulated and in-use conditions.

Studies on the microbiology of drycleaning continued. Data were obtained on the numbers and kinds of microorganisms present in the solvents and in the fabrics at different points in the cleaning units, and after steam pressing. In most cases several factors, especially steam pressing, combined to reduce the number of bacteria to a low level. However, in certain areas of some garments an appreciable number of bacteria survived all stages of drycleaning. As in laundering, bacteria are transferred from one fabric to another during drycleaning.

Studies on the persistence of viruses on fabrics continued under contract. In general, both viruses survived longer on woolen than on cotton fabrics. Poliomyelitis virus persisted on wool fabrics as long as 20 weeks and on cotton fabrics as long as 4 weeks. Vaccinia virus persisted on wool fabrics as long as 14 weeks and on cotton fabrics as long as 10 weeks. The method of exposure (contact, aerosol, contaminated dust), relative humidity and type of fabric affected the duration of viral persistence on the fabrics.

Four articles were submitted for publication: The Microbiology of Drycleaning; Survival of Bacteria in Cold Water Laundering; Quantitative Studies on Fabrics as Disseminators of Viruses I. Persistence of Vaccinia Virus on Cotton and Wool Fabrics, and II. Persistence of Poliomyelitis Virus on Cotton and Wool Fabrics. One article, Laundry Hygiene, was prepared for the 1965 Yearbook of Agriculture.

PUBLICATIONS -- USDA AND COOPERATIVE PROGRAMS

Removal of Soil and Undesirable Changes in Textiles

McLendon, V. I. and Richardson, F. 1965. Oxides of Nitrogen as a Factor in Color Changes of Used and Laundered Cotton Articles. Amer. Dyestuff Rptr. 54(9): 15-21.

Information for Consumer Guidance

Furry, M. S. 1965. Detergents for Home Laundering. Home and Garden Bul. No. 49, 8 pp. (Sl. Rev.).

McLendon, V. I. 1965. Removing Stains from Fabrics: Home Methods. Home and Garden Bul. No. 62, 30 pp. (Sl. Rev.).

AREA NO. 3: RURAL FAMILY HOUSING

Problem. The accelerated demand for housing, because of increasing population, has focused attention on the need for improved design criteria based on research, that take into account family living requirements. Special problems exist in relation to housing for low income, elderly and migrant families. Quantitative data, essential for developing design criteria, are inadequate for planning homes for families in the moderate income group and woefully lacking for planning for the disadvantaged groups.

USDA AND COOPERATIVE PROGRAMS

Field studies of housing requirements are conducted in rural areas differing in geographic or climatic conditions and among groups with widely differing cultural backgrounds and economic resources. Type and scope of household activities are investigated; patterns of use of water, electricity, and gas are studied; and the dimensions and arrangements of space needed for family living are determined. Efficient and energy-saving ways of performing household tasks, using housing facilities and mechanical equipment of different designs, are developed. Based on results of these investigations, criteria for efficient arrangements of kitchens and other areas of the house are established, and planning guides and house plans are developed to meet the needs of families and those who work with them. The special needs are considered of the program of the Farmers Home Administration, Federal Extension Service, Public Housing Administration, and of architects, designers, builders, and educators.

Home economists and architects collaborate in the research which is conducted at headquarters in Beltsville, Md. The Division's scientific effort devoted to research in this area is approximately 8.0 professional man-years, of which 1.5 are basic in nature.

PROGRAM OF THE STATE EXPERIMENT STATIONS

The States' research program in the area of Rural Family Housing and Household Operations has been particularly concerned with environmental factors affecting human comfort and use of space.

In the Western region scientists studied the quality and quantity of natural light available for dwellings; the amount needed for comfort; and means to modify unfavorable conditions by both internal and external treatment (e.g., drapes, building materials, finishes, house orientation.)

Researchers in the Southern region are studying environmental and economic factors as related to improved rural housing. The environmental factors include temperature, relative humidity, noise, and skid resistance of resilient floor surfaces. Economic factors relating to consumer choice

of environmental control systems are being investigated. Of special interest was the collection of data on noise levels in 20 homes. The National Bureau of Standards cooperated through exchanges of procedural information.

Additional projects include studies on: determination of basic criteria for design and planning of housing in urban-rural fringe areas; heat loss through walls of selected building materials; identification of dimensions of complexity of household tasks; the effect of the location of sink-dishwasher on functional kitchen arrangements; and problems of energy expenditures of women engaged in household tasks.

Total State program in fiscal 1964 amounted to 16.0 professional man-years, with 16 States contributing. Approximately one-half of the program is regional, with the Southern and Western regions participating. The Department has participated in the Southern regional program.

PROGRESS -- USDA AND COOPERATIVE PROGRAMS

A. Family Requirements

Energy expenditures of women for performing a light and moderately heavy activity increased in a hot-humid environment (95°F., 65% relative humidity) as compared with expenditures in a comfortable environment of 75°F., 45% relative humidity. Other physiological measurements--pulse rate, blood pressure, and body temperature also showed significant increases in the hot, humid environment as compared with the comfortable environment.

Energy expenditures of women using stairs, and pulse rate and systolic blood pressure for the recovery period, varied significantly with the three designs of stairs tested. Hence, these physiological measurements are suggested as good criteria for evaluating stair design.

An article, "To Save Energy," was prepared for the 1965 Yearbook of Agriculture.

The following manuscripts were prepared: The Effect of Ambient Temperatures and Relative Humidity on the Physiological Responses of Women at Work; The Effect of Repetition on the Energy Expenditure of Women Performing Selected Activities; Energy Expenditure of Women for Cleaning Carpets with Three Types of Vacuum Cleaners; Work-Surface Levels for Home Laundry Areas in Relation to Human Energy Expenditures; Work-Surface Levels in Relation to Human Energy Expenditures; Physiological Responses, Including Energy Expenditures, of Women Using Stairs of Three Designs; and Water Management for Farm Household Activities.

B. Planning Guides and House Plans

Five House Planning Aids were published: Dining Areas, Laundry Areas,

Household Linen Storage, Bathrooms, and Storage for Cleaning Supplies. Another on Bedrooms and Clothes Closets was completed and submitted for printing.

The Laboratory completed all of the House Planning Aids for which it was wholly responsible with the exception of one on Living Areas for which sufficient research data are not available. Of the eight planned jointly with AE, time permitted the completion of only one, Workrooms, which was submitted for publication. These House Planning Aids present findings of research on space requirements for activity and storage areas in a condensed and pictorial form directed especially to families planning low or medium cost homes.

Emphasis continued in cooperation with AE on the development of plans for small homes suitable for Farmers Home Administration clients.

The Northeast House Plan Exchange Committee was organized and one plan, a Cape Cod, developed cooperatively by the States and CH and AE.

Three articles, The Kitchen, Bathrooms, and Planning for Safety, were prepared for the 1965 Yearbook of Agriculture, Consumers All.

PUBLICATIONS -- USDA AND COOPERATIVE PROGRAMS

Planning Guides

Howard, M. and Parker, W. R. 1964. Planning Bathrooms for Today's Homes. Home and Garden Bul. No. 99, 20 pp.

Howard, M., Tayloe, G., and Parker, W. R. 1964. Household Linen Storage. USDA Misc. Pub. No. 980, 4 pp.

Tayloe, G., O'Brien, C., and Parker, W. R. 1964. Dining Areas. USDA Misc. Pub. No. 960, 4 pp.

Tayloe, G., Parker, W. R., and Howard, M. 1964. Laundry Areas. USDA Misc. Pub. No. 961, 4 pp.

Tayloe, G., Parker, W. R., and Howard, M. 1964. Bathrooms. USDA Misc. Pub. No. 988, 4 pp.

Tayloe, G. and O'Brien, C. 1965. Storage for Cleaning Equipment. USDA Misc. Pub. No. 996, 2 pp.

House Plans -- Cooperative with AE

Anonymous. 1964. 4-Bedroom Farmhouse with Basement. Cooperative Farm Building Plan Exchange Plan No. 7151. USDA Misc. Pub. No. 973, 2 pp., illus.

- 1965. 3-Bedroom Farmhouse with Beltsville Energy Saving
Kitchen-Workroom Design No. 1. Cooperative Farm Building Plan
Exchange Plan No. 7161. USDA Misc. Pub. No. 993, 2 pp., illus.
- 1964. 4-Bedroom Farmhouse (Frame Construction). Cooperative
Farm Building Plan Exchange Plan No. 7162. USDA Misc. Pub. No. 978,
2 pp., illus.
- 1964. 3-Bedroom Farmhouse with Basement. Cooperative Farm
Building Plan Exchange Plan No. 7163. USDA Misc. Pub. No. 974,
2 pp., illus.
- 1964. A-Frame Cabins. Cooperative Farm Building Plan Exchange
Plan Nos. 5964 and 5965. USDA Misc. Pub. No. 981, 2 pp., illus.

AREA NO. 4: HOUSEHOLD EQUIPMENT

Problem: Mechanical equipment for a variety of household tasks has become an accepted part of our standard of living. Homemakers need and are asking for information on the selection, use, and care of household equipment to assure maximum return for the money invested, and maximum satisfaction in terms of performance. To obtain the information needed for such guidance, performance requirements and operating characteristics of different designs of equipment must be determined by unbiased agencies.

USDA AND COOPERATIVE PROGRAMS

The Department has a continuing program of applied research conducted by home economists and physicists on operating characteristics and performance requirements for household equipment, and methods of caring for equipment and nontextile furnishings. Test procedures for these determinations are developed as necessary. Technical data are made available for incorporation into Federal specifications. Investigators prepare unbiased guidance materials for consumers and serve the consumers' interest on committees of the American Standards Association responsible for developing trade standards for household equipment and utility systems for the home.

The research program is carried on at Beltsville, Md., and in fiscal 1965 totaled 3.5 professional man-years. Manufacturers cooperate in this work by giving consultation in the selection of models to be used and in development of test procedures, and by consigning household equipment.

PROGRAM OF THE STATE EXPERIMENT STATIONS

The States' research on household equipment and nontextile furnishings is limited. One State has been concerned with the control of temperature and humidity as they affect the operation of household appliances, one with the relationship between the composition of cooking utensils and the performance of thermostatically controlled gas and electric surface units, and another with the use of portable cooking appliances as a replacement for conventional equipment under specific conditions.

The total State program in fiscal 1964 was 1.3 professional man-years.

PROGRESS -- USDA AND COOPERATIVE PROGRAMS

A. Functional Requirements and Specifications

American Standards Association committee work leading to the development of specifications for household equipment continued through assignments of CH staff to six sectional committees concerned with the following areas of work: American Gas Association Approval Requirements, Electric Water

Heaters, Household Electric Ranges, Household Refrigerators and Home and Farm Freezers, Plumbing Materials and Equipment, and Portable Electric Appliances. Appropriate action was taken on a proposed American Standard for Household Electric Can Openers. Panel 19 of the committee on Plumbing recommended that CS-20-63 and CS-77-63, recorded voluntary standards of the trade published by the U.S. Department of Commerce, be proposed as American Standards Association standards. Suggestions were made for additions and deletions for the next revision of these standards.

A proposed international standard for washing machines, electric blankets, vacuum cleaners, and household electric ranges and ovens was reviewed. Comments were prepared in cooperation with personnel of the Farm Electrification Branch (AE) for transmittal to the International Electrotechnical Commission.

B. Operating Characteristics, Use, Maintenance, and Care of Equipment

Laboratory work was completed to evaluate the type of test load for domestic dishwashers--place settings only; place settings and serving dishes; and place settings, serving dishes and preparation utensils. Loads consisting of place settings only proved to be as satisfactory as the mixed loads described above. Dishwashers with basic cycles of two washes separated by a rinse were more effective in the removal of soil than dishwashers with other basic cycles.

The Microbiology Unit found that although mechanical dishwashing did not sterilize the utensils, a large percentage of them had less than 100 bacteria per utensil, and would, therefore, be acceptable from a sanitation standpoint.

The following six articles were cleared for publication: Mechanical Dishwashers for the Home--Characteristics of Natural Residues and Artificially Applied Food Soils Used in Evaluation of Performance; Formulation of a Laboratory Soil for Evaluation of Dishwasher Performance; Use of Panel of Judges for Evaluating Cleanness of Machine Washed Tableware; Mechanical Dishwashers for the Home--Their Performance Characteristics; Effect of Selected Temperatures of Water and Dishwashing Compounds on Performance of Dishwashers; and Determination of Soleplate Temperatures for Ironing Fabrics of Different Fibers.

A paper on The Microbiology of Home-Type Mechanical Dishwashing was presented at the mid-year meeting of the Chemical Specialties Manufacturing Association in Chicago, May 1965. This paper will be included in the published proceedings of the Association and will be published in the September 1965 issue of Soap and Chemical Specialties.

Three articles, Waste Disposers, Dishwashers, and Your Laundry, were prepared for the 1965 Yearbook of Agriculture Consumers All.

PUBLICATIONS--USDA AND COOPERATIVE PROGRAM

Operating Characteristics, Use, Maintenance, and Care of Equipment

Taube, R. K. 1964. Home Laundering: The Equipment and the Job. Home and Garden Bul. No. 101, 24 pp. (Sl. Rev. May 1965).

Line Project Check List -- Reporting Year July 1, 1964 to June 30, 1965

Work and Line Project Number	Work and Line Project Titles	Work Locations During Past Year	Line Project Incl. in	
			Summary of Progress (Yes-No)	Areas and Subheading
CH 1	Fabric quality, construction, and care of clothing and household textile articles.			
CH 1-15	Yellowing of cotton fabrics.***	Beltsville, Md.	Yes	2-A
CH 1-20	Improvement of fabric color with fluorescent whiteners.**	Beltsville, Md.	Yes	2-A
CH 1-21	End-use qualities in knitted fabrics as affected by staple length, by mercerization, and by blending of medium staple cotton with nylon.***	Beltsville, Md.	Yes	1-A
CH 1-24	Clothing to meet the requirements of children.**	Beltsville, Md.	Yes	1-C
CH 1-25	Bibliography of research pertaining to children's shoes.***	Beltsville, Md.	Yes	1-B
CH 1-26	Draw curtains--development of pro- cedures for estimating yardage, cutting, making, and hanging.***	Beltsville, Md.	Yes	1-D
CH 1-27	Redeposition of bacteria on fabrics during laundering.**	Beltsville, Md.	Yes	2-B
CH 1-28	Clothing repair--A revision of Farmers Bul. 1925, "ABC's of Mending."**	Beltsville, Md.	Yes	1-D
CH 1-29	Use of hypochlorite bleach on soiled cotton fabrics as a factor in deterioration of cotton fabrics.**	Beltsville, Md.	Yes	2-A
CH 1-30	Elastic recovery of cotton fabrics of plain and double knit construc- tions.**	Beltsville, Md.	Yes	1-A
CH 1-31	Elastic recovery and dimensional sta- bility of plain knit wool fabrics.**	Beltsville, Md.	Yes	1-A
CH 1-32	The microbiology of drycleaning.**	Beltsville, Md.	Yes	2-B
CH 1-33(C)	Quantitative studies on fabrics as disseminators of microorganisms.*	Beltsville, Md.	Yes	2-B
CH 1-34(C)	Development of instrumentation and procedures for anthropometric measurements essential for the improvement of sizing systems for children's footwear.*	Rochester, N.Y.	Yes	1-B

*Initiated, **discontinued during reporting year, ***discontinued prior to reporting year.

Line Project Check List -- Reporting Year July 1, 1964 to June 30, 1965

Work and Line Project Number	Work and Line Project Titles	Work Locations During Past Year	Line Project Incl. in	
			Summary of Progress (Yes-No)	Areas and Subheading
CH 2	Functional requirements, use and care of the house and its equipment.			
CH 2-4(R)	Human energy expenditures for household activities.***	Beltsville, Md.	Yes	3-A
CH 2-6(R)	Preparation of specifications for household equipment.	Beltsville, Md.	Yes	4-A
CH 2-9(R)	Participation in development of farm-house plans for Regional Services.	Beltsville, Md.	Yes	3-B
CH 2-11(R)	House planning guides for rural homes.	Beltsville, Md.	No	
CH 2-14	Planning guides for energy-saving kitchens and workrooms.**	Beltsville, Md.	No	
CH 2-15	Hand-iron temperatures for present day fabrics.***	Beltsville, Md.	No	
CH 2-16	Farm household water use: A pilot study.***	Beltsville, Md.	No	
CH 2-17	Performance of mechanical dishwashers for the home.	Beltsville, Md.	Yes	4-B
CH 2-18	Guides for planning activity and storage areas in housing for low- and medium-income families.	Beltsville, Md.	Yes	3-B
CH 2-20	Effect of ambient temperature and humidity on human energy costs of performing typical household activities.**	Beltsville, Md.	Yes	3-A

*Initiated, **discontinued during reporting year, ***discontinued prior to reporting year.